

--11. A method of transmitting a text represented by digital data, the structure of which is defined by a grammar with grammatical rules, from a transmitter to a receiver comprising the steps of:

(a) in the transmitter, for the purpose of encoding, the grammatical rules contained in the text are converted to a sequence of syntax-directed coding (SDC) symbols by parsing the text and generating a parse tree, such that to each node in this parse tree there is attributed an SDC symbol, which out of all the rules permitted by the grammar at this site unambiguously identifies the rule that is actually contained in the text, and such that the SDC symbols are concatenated, according to a fixed order of traversing all nodes of the parse tree, to form a linear sequence of SDC symbols;

(b) sending the SDC symbol sequence from a transmitter to a receiver for storage in the receiver;

(c) in the receiver, for the purpose of decoding, in a stack machine the grammatical rule corresponding to each stored SDC symbol in the sequence of SDC symbols is executed in order to generate output data that contain the text, in which process an uppermost entry in a stack memory of the stack machine is replaced according to a grammar production determined by an SDC symbol that has been input, and parts of the grammatical rules that cannot yet be completely processed are deposited in a stack memory, whereas

parts of the production for which substitution is complete are processed immediately to form part of an executable program for a real processor or a virtual machine.--

--12. A method as claimed in Claim 11, including the steps of:

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- (a) initializing the stack machine by depositing a specific start symbol or non-terminal symbol into an empty stack memory;
 - (b) reading an uppermost symbol from the stack memory;
 - (c) testing whether the read symbol is a terminal or a non-terminal symbol;
 - (d₁) if the read symbol is a terminal symbol, outputting the symbol regardless of whether additional symbols are present in the stack memory, and continuing the method with step (b) above and terminating the method whenever the stack memory is empty, or
 - (d₂) if the read symbol is a non-terminal symbol, reading the next SDC symbol from the input stream;
 - (e) dependent on what SDC symbol has been read, selecting only one alternative or chain of terminal and/or non-terminal symbols out of the set of alternatively applicable replacement rules or productions that are valid for the non-terminal symbol currently being processed;

(f) placing the chain of terminal and/or non-terminal symbols into the stack memory and then continuing the method with step (b) above.--

--13. A method as claimed in Claim 11, wherein

(a) to each node in the parse tree there is attributed an SDC symbol and the probability distribution of all the SDC symbols possible in this node,

(b) the sequence of SDC symbols is subjected to entropy encoding in conformity with the associated probability distributions, and

(c) the entropy decoding is carried out with a probability distribution of SDC symbols identical to that used for the entropy encoding.--

--14. A method as claimed in Claim 13, wherein

(a) the probability distribution of the rules that can be applied in a node, starting from an initial distribution, is adapted at each appearance of an SDC symbol in such a way that the probability of the SDC symbol that appears is increased and the probability of all other symbols is correspondingly reduced,

(b) the currently valid distribution of occurrence probabilities is assigned to the SDC symbols of the associated node type,

(c) the probability distribution of all SDC symbols in the current node, together with the SDC symbol to be encoded, forms a model for an arithmetic encoding,

(d) during decoding an end of the text is recognized by the fact that the stack memory is empty, and

(e) an End-Of-Message (EOM) symbol required for arithmetic coding is eliminated.--

--15. Apparatus for transmitting a text represented by digital data, the structure of which is defined by a grammar with grammatical rules, from a transmitter to a receiver, comprising

(a) an encoder, which comprises

(aa) a scanner to transform text consisting of a sequence of readable characters into a sequence of terminal symbols,

(ab) a parser to find grammatical rules, the successive application of which was originally used to generate the sequence of terminal symbols,

(ac) a mapper, which unambiguously associates syntax-directed symbols with the rules identified by the parser and outputs these symbols in a fixed sequence, and

(b) a decoder, which comprises

(ba) a stack machine that, according to an uppermost symbol in the stack memory and any adjacent SDC symbol, outputs the already fixed terminal symbol, or deposits

the sequence of terminal and/or non-terminal symbols associated with the current symbol into the stack memory, and

(bb) a lexicon that replaces the terminal symbols by chains of readable alphanumeric characters, such that the decoder immediately processes parts of the production for which substitution is complete to form part of an executable program for a real processor or a virtual machine.--

--16. Apparatus as claimed in Claim 15, in which the text transformed by the scanner into a sequence of terminal symbols is a program present in the source text or in a form derived from the source text by a preprocessor, and in which a code generator is provided that generates from the sequence of terminal symbols an executable machine code or an intermediate code to be executed on a virtual machine.--

--17. Apparatus as claimed in Claim 15, which comprises

(a) in the transmitter

(aa) a table that contains the probability distributions of the SDC symbols for each node type in a parse tree generated by a parser and the contents of which are established at initialization with fixed initial probability distributions for each node type,

(ab) an adapter that updates the probability distribution of the SDC symbols for a node type valid at the current moment with reference to the existing probability distribution, the SDC symbol to be encoded and the current node type, and enters this new probability distribution into the table, and

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(ac) an arithmetic encoder that encodes the SDC symbol currently to be encoded with the currently valid probability distribution supplied by the adapter;

(b) in the receiver

(ba) a table that contains the probability distributions of the SDC symbols for each node type, the contents of which are established at initialization with fixed initial probability distributions for each node type,

(bb) an adapter that updates the probability distribution of the SDC symbols for the node type valid at the current moment, as established by the stack machine, with reference to the existing probability distribution, the SDC symbol to be decoded and the current node type, and enters this new probability distribution into the table, and

(bc) an arithmetic decoder which, with reference to the currently valid probability distribution of the current node type supplied by the adapter, decodes the next SDC symbol and sends it to the stack machine for further processing.--
